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May 28, 1999

Via Hand Delivery

Magalie Roman Salas
Secretary
Federal Communications Commission
The Portals
445 12th St., SW
Washington, D.C. 20554

Re: CC Docket No. 94-102 - FCC E911 Order
Ex Parte Presentation

Dear Ms. Salas:

On May 27th, 1999, Dan Allen, President & CEO of Integrated Data Communications (IDC), a provider of a signaling protocol technology for the handset solution, and Dan Preston, Co-Founder and Chief Technology Officer of IDC, and I, as attorney for IDC, met with Deputy Bureau Chief Jim Schlichting, the Wireless Telecommunications Bureau Policy staff, and the Office of Engineering and Technology. We met with Nancy Boocker, Daniel Grosh, Won Kim, Barbara Ridler, Marty Liebman, and Ron Netro from the Policy Division; and with Rebecca Dorch, Robert Bromery, Bob Eckert, and Harry Wong from the Office of Engineering and Technology.

The purpose of the meetings was to discuss IDC's official report (IDC Report) on its field test results for the King County E911 Program Office in Washington State. Copies of IDC's Report were distributed to FCC staff. In our meetings, we discussed the following:

SEATTLE
PORTLAND

I. PURPOSE OF REPORT - MEET KING COUNTRY E911 REQUIREMENTS

IDC prepared its report on a field test conducted in the "real world" using existing customer premise equipment and vendor technology for the King County E911 Program Office in Washington State. IDC's technology enables increased public safety through improved call response time.

A. Requirements

First, King County wanted to know whether FCC requirements for Phase II were technically achievable. Second, King County wanted to know if IDC's technology could work with existing PSAP equipment and current vendor technology. Thereafter, King County requested additional requirements, more stringent than FCC requirements, for Phase II *(see attached graphic page 4-3)*:

1. Selectively route calls by latitude and longitude of caller to appropriate PSAP;
2. Compatibility with all wireless carriers' systems;
3. Locate caller to within 40 feet;
4. Display of caller's location graphically, using legacy CPE;
5. Provide caller's latitude, longitude, altitude, speed, and direction of travel;
6. Refresh ALI; and
7. Find 90% of all callers.

IDC was able to meet and exceed many of those additional, more stringent, King County requirements.

B. Duration and Location

King County field tests were conducted from June 1, 1998 to November 30, 1998 throughout the Seattle metropolitan area. IDC and King County both wished to create a "real-world" environment in which to conduct the tests. Accordingly, a variety of testing locations were sampled using live air-interface networks and an actual King County 9-1-1 trunk was modified to respond to a call of "5-1-1" for the field test. Calls were placed, relayed, and routed through the system in the same manner of an actual emergency.

Calling locations included *(see attached graphic page 6-1)*:

- Downtown Seattle (urban canyon);
- Mercer Island (suburban and waterborne);
- North Bend (rural);
- Snoqualmie Pass (mountainous);
- Seattle Arboretum (densely forested); and
- Washington State Dept. of Transportation monuments (various roads).

IDC worked closely with King County to determine the appropriate mix of calling environments in order to best reflect the true distribution of callers to PSAPs. That distribution is illustrated as follows:

- Urban - 20%
- Suburban - 30%
- Rural - 20%
- Mountainous/Remote - 20%
- Other - 10%

IDC worked primarily with the cooperation of US West, GTE Wireless, AirTouch, and Nextel. Through use of personal accounts, IDC also used AT&T Wireless and Sprint PCS phones and networks to make test calls. Field test results were based on 4,870 scientifically documented calls, using 10 different handset unit models from Motorola, NOKIA, Sony, and Ericsson *(see attached graphic page 7-20)*.

IDC tested 4 wireless air interfaces AMPS, N-AMPS, CDMA, iDEN, using both digital and analog modes as available by the carrier *(see attached graphic page 7-20)*:

- 21% of calls were AMPS;
- 22% of calls were N-AMPS:
- 54% of calls were CDMA; and
- 3% of calls were iDEN.

Over 50% of the calls were CDMA because IDC frequently used GTE Wireless' system to test its selective routing capabilities (see below). GSM calls were not tested because that technology was not available in the Washington state market. However, IDC is having discussions with Western Wireless about conducting tests of its *new* VoiceStream network, which uses GSM. Although TDMA works with IDC's technology as well, TDMA calls were not "officially" tested, and therefore, those results are not a part of IDC's Report.

Overall, the field tests showed increasing improvement based on continuing evolution of the GPS product from SiRF technology. IDC's test results are based on its use of the Beta 1.5 version of a GPS chip from SiRF. In testing, Beta 3.5 demonstrated a **245%** increase in accuracy (of location) over the Beta 1.5 version. The test results from Beta 3.5 are not included in IDC's Report because that technology was used in the latter part of the field test and would have

skewed the test results. IDC will be testing a Beta 4.6 version, and possibly a Beta 5.1 version, later this year. IDC expects these new versions to show improved coverage in buildings, tunnels, and other structures, with penetration of foliage, and increased accuracy up to 20 feet.

II. RESULTS IN IDC'S REPORT

First, 100% of all calls were located. Next, according to information from King County, approximately 48% of E911 calls to the PSAPs are from the major highways. The results of the field test were as follows *(see attached graphic page 7-14)*:

1. 94% of all calls fell within the FCC Phase II requirements of 406 feet (125 meters);
2. 75% of all calls were within 150 feet accuracy;
3. 62% of all calls were within 100 feet accuracy;
4. 51% of all calls were within 70 feet accuracy; and
5. 31% of all calls were within 40 feet accuracy.

A. Limitations

Currently, IDC's technology cannot show that it can locate a caller by floor in a building without the assistance of a small GPS repeater antennae. However, IDC can provide the last known location of the caller (e.g., front door address of the building). Nor, can IDC currently locate wireless calls made in tunnels or subways. IDC did not test battery life, power consumption, or antennae types or placement. According to discussions with some equipment manufacturers, however, battery drain or power consumption would be negligible. Also, GPS would not interfere with the antennae, or require different placement of the antennae on the handset.

In addition, because urban canyons produced a reflective effect, that effect diminished the ability to consistently locate the caller to within 40 feet, but IDC was still able to locate those callers within FCC Phase II requirements. And lastly, IDC's technology is not able to transmit location data in areas with no cellular coverage.

B. Special Features

Accurate and reliable location information is key to public safety. Apparently, about 40% of wireless callers are unable to relay their location to E911 call takers. The inability to communicate location was the case for about 34,000 calls per day in 1998, which as a result, takes public safety 2.5 to 3 times longer to determine the correct location for wireless calls. Therefore, the ability to selectively route calls to the correct PSAP, when a mobile wireless caller makes a 911 call, and to track and refresh the location information of that caller, saves time and thereby saves lives.

1. Selective Routing

In the urban canyon environment, there are three types of calls which must be correctly routed to the appropriate PSAP: (a) from an interstate highway that runs through a city; (b) from an interstate highway as the caller takes an exit ramp; or (c) from a downtown street location. Each of these calls were correctly routed 100% of the time: (a) a call from an interstate highway that runs through a city was routed to the Washington State Patrol; (b) a call from an interstate highway exit ramp was routed to Seattle City Police Department; and (c) a call from a downtown street location was correctly routed to the Seattle City Police Department.

In the suburban environment, calls were correctly routed to the King County Sheriff's office. In rural and mountainous environments, calls were correctly routed to the Washington State Patrol *(see attached graphic page G-2)*.

2. Tracking, Refreshing and Call Transfer

During its field test, IDC was able to show on a map, using existing customer premise equipment at the PSAP, the wireless caller's longitude, latitude, altitude, speed, heading, and location specified in feet *(see attached graphic page 8-2)*. In fact, a map with the wireless caller's location came up on the PSAP screen just before the phone rang with the 911 call! IDC's technology can refresh location information on demand by the call-taker, thus allowing the call-taker to track the caller who made the 911 call. IDC's technology can also allow for transfer of a 911 call, from one call-taker to another call-taker, along with the map showing the caller's location information.

III. IDC's PROPOSAL FOR E911

IDC supports the FCC's Phase II October 1, 2001 deadline for E911. IDC believes that only a small percentage of wireless handsets will require a waiver, if implementation begins now.

At present, several equipment manufacturers and wireless carriers see the market opportunity for location technology, particularly for E911. But, those companies do not think the FCC has been sufficiently clear that it would accept a handset-based approach to meeting its E911 requirements for Phase II. As a result, equipment manufacturers and wireless carriers are hesitant to independently make the investment to provide E911 capability in the wireless handset.

IDC proposes that the FCC clarify the circumstances under which it would approve any handset waivers. IDC suggests the following criteria for consideration by the FCC:

1. That wireless carriers must begin implementation by January 1, 2001.

2. Penetration for old/new handsets in the market that are location enabled technology should be at:

   - 33% by October 1, 2001
   - 75% by December 31, 2002
   - 90% by December 31, 2003

3. Penetration for new handsets with location enabled technology going forward should be at:

   - 100% by October 2001

4. These figures assume handset technology will provide accuracy of at least 30 meters, based upon a RMS measure; and CTIA's published cellular churn rate.

Pursuant to Commission's Rule Section 1.1206, two (2) copies of this ex parte letter with attachments, and two (2) copies of IDC's Report (1 color, 1 black and white) are enclosed for filing in this docket. If you, or anyone else, have questions on this matter, I can be reached at 206.623.4711. Thank you.

Very truly yours,

ATER WYNNE LLP

Angela Wu

Attachments
cc: Dan A. Allen, President & CEO
Dan A. Preston, Co-founder & CTO
James A. Vroman, Co-founder & Executive Vice President

4.3.8.1 Mountainous areas
4.3.8.2 Skyscrapers and urban canyons
4.3.8.3 Tunnels
4.3.8.4 Highways serviced by: Seattle Police Department, Washington State Patrol and the King County Sheriff's Office.
4.3.8.5 General neighborhoods
4.3.8.6 Waterways

4.3.9 PSAPs To Be Included In Test (total of 3)

4.3.9.1 King County Sheriff PSAP (downtown Seattle)
4.3.9.2 Seattle Police Department PSAP (downtown Seattle)
4.3.9.3 Washington State Patrol (Eastgate, 156th Street)

4.4 KING COUNTY REQUIREMENTS VS. FCC REQUIREMENTS

The King County requirements stated in paragraph 4.3 are more stringent than the FCC requirements. While the FCC requires the location to be accurate within 125 meters (406 feet) for 67% of the calls, King County requested accuracy to 40 feet (12.3 meters), 90% of the time. *It is the consensus of the PSAPs in King County, WA that approximately 40 feet is the level of accuracy needed for the location to be usable for effectively dispatching assistance to the caller.* **Figure 4-2** (below) compares these requirements – using both radiuses from the actual location (406-ft. meters vs. 40-ft. meters) and the area of the location (517,847 square feet vs. 5,025 square feet). Based upon the accuracy of the area, the King County, WA requirements are 103 times more accurate than the FCC Phase II requirement.

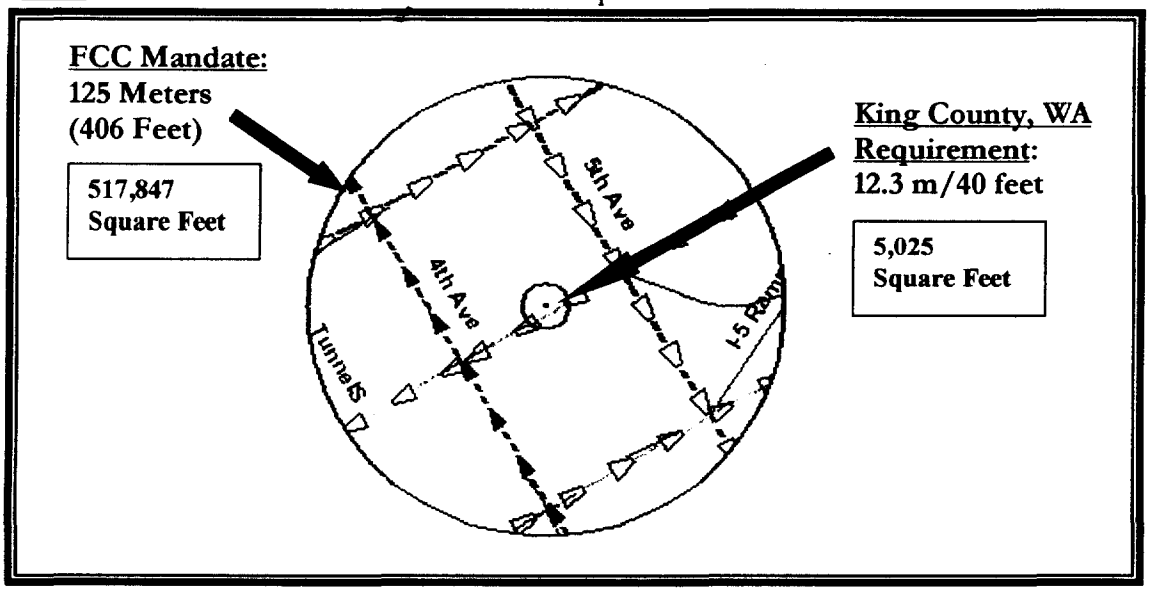


Figure 4-2. Comparative radius and area accuracies – FCC requirements vs. King County, WA Requirements

6.0 TECHNICAL EVALUATION
THE PLAN AND STUDY

6.1 OVERVIEW OF THE TECHNICAL STUDY

6.1.1 Background

In the search for an accurate location service that required minimal impact to the existing infrastructure, Integrated Data Communications (IDC) and King County conducted a comprehensive handset-based wireless E-911 field trial. IDC supplied the inband communications protocols and integration for a team of participants to implement a "wireless handset to dispatcher headset" location solution, which included selective routing of calls to the appropriate Public Safety jurisdiction. At King County's request, IDC used existing equipment and vendor technology, while adding new participants and products as required to complete implementation of the parts of the model discussed in Section 5.0. IDC's augmentation of Global Positioning System (GPS) receivers and its proprietary Data Control protocols to the handsets was all that was required of the wireless carriers involved in the demonstration.

6.1.2 Test Areas

The King County E911 Program Office determined the test calling areas and required IDC to demonstrate its wireless location system in diverse environments to include; urban canyons, waterfronts, mixed-use suburban areas, and mountainous areas near Snoqualmie pass (east of Seattle on I-90). Weather conditions in Seattle and in the mountain regions included substantial inclement weather throughout the demonstration. **Figure 6-1** includes actual photographs of calling locations used during the field trial; note that calls were made from a variety of challenging venues throughout the greater Seattle, Washington area.

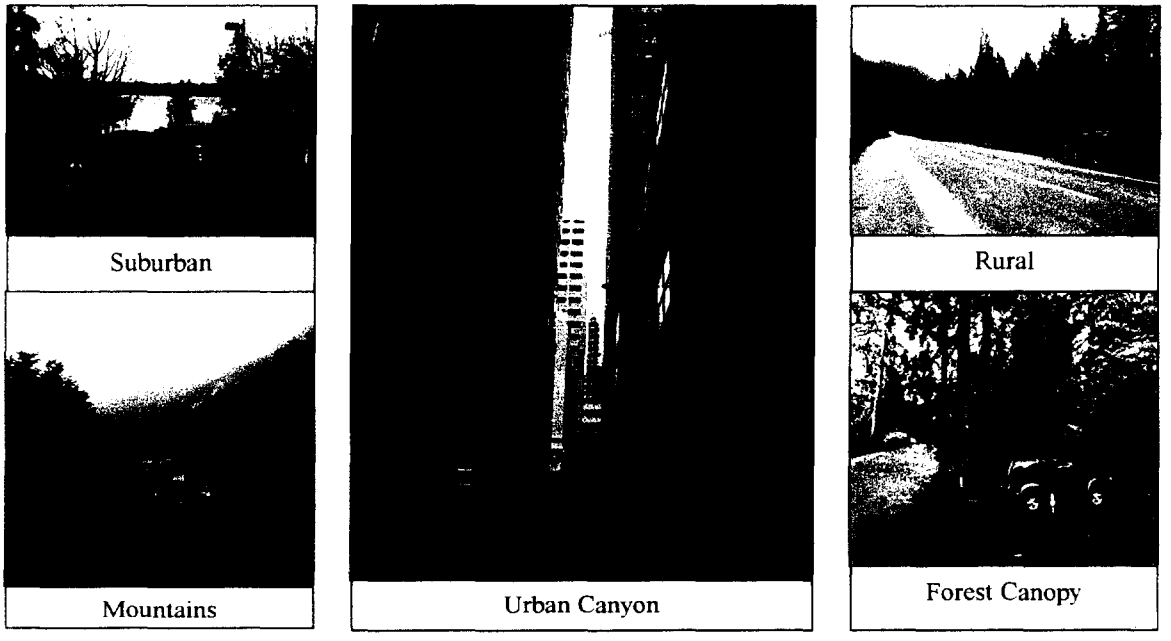
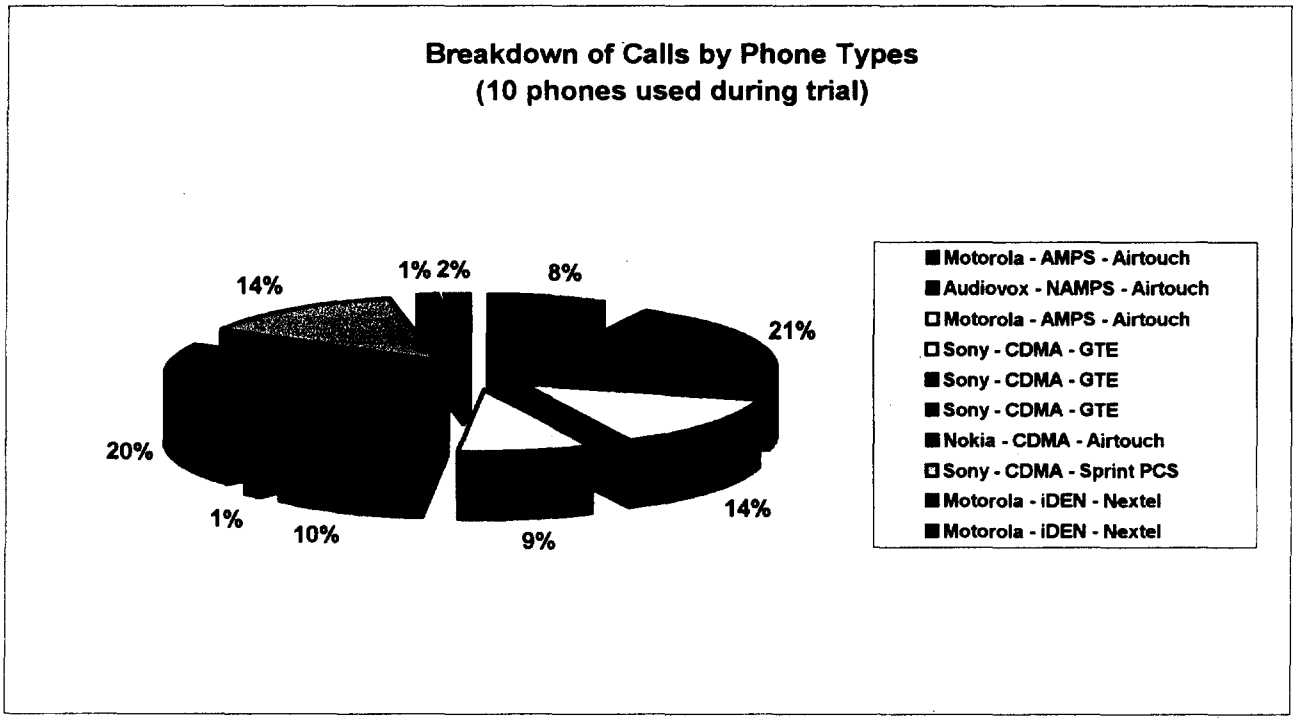


Figure 6-1. Samples of Diverse Calling Environments for the King County Trial

6.1.3 Additional Test Participants and Roles



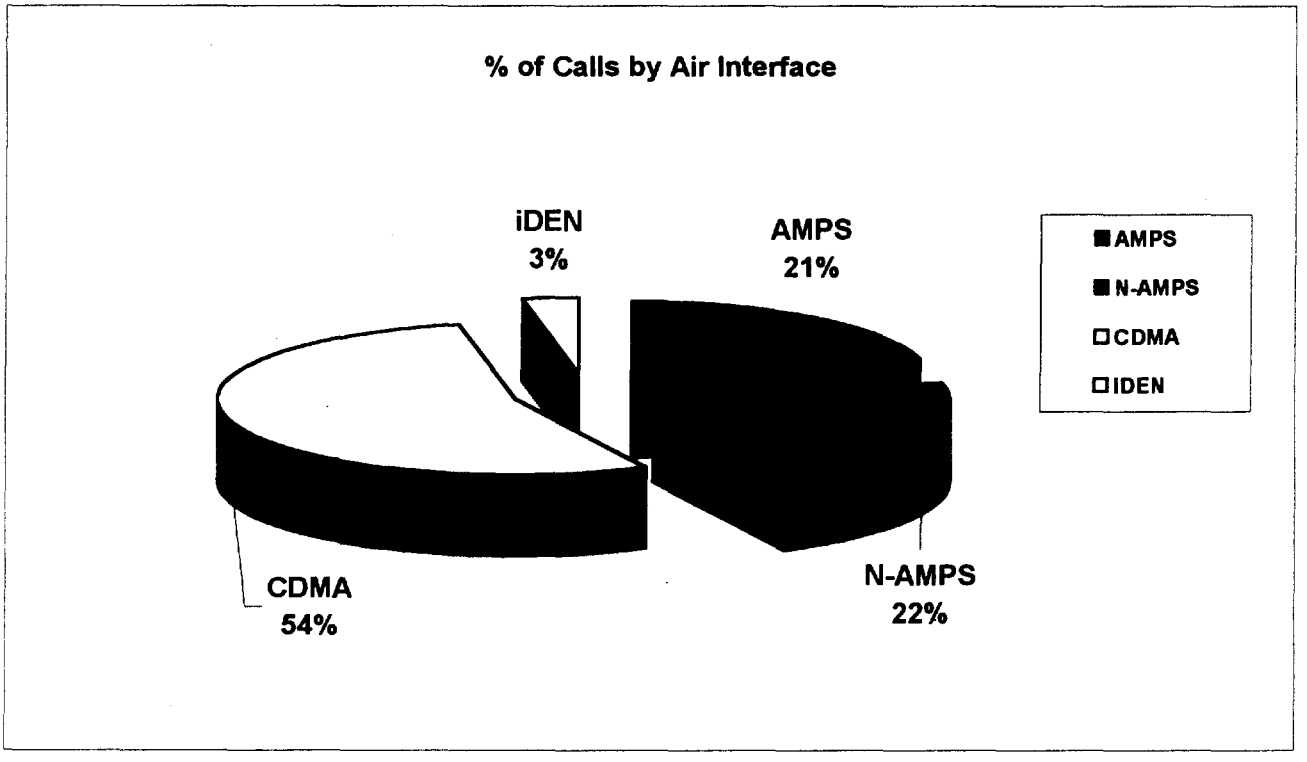
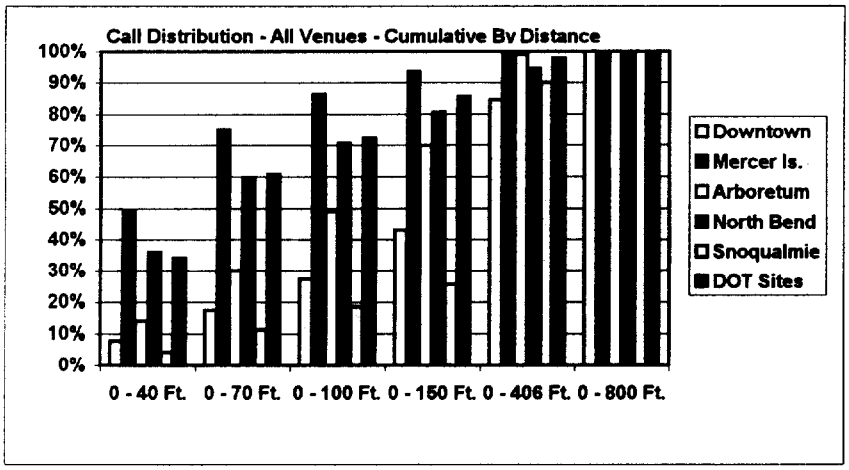
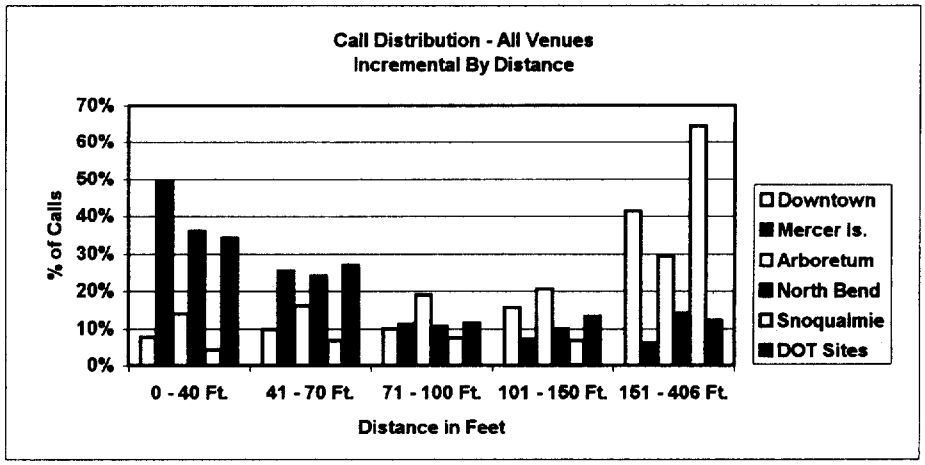


Figure 7-10. Breakdown of Calls by Phone Model Type. Breakdown of Calls by Air Interface Type





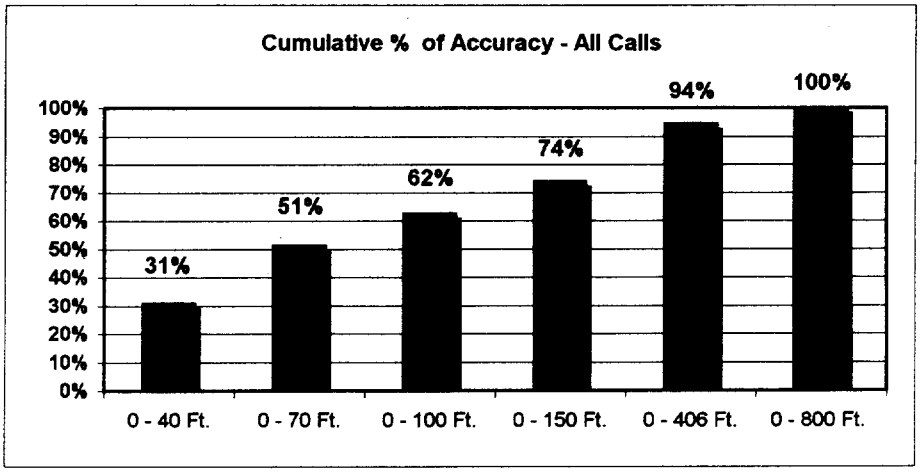


Figure 7-5. Call Distribution - By Venue (Cumulative and Incremental) and Cumulative Accuracy of all Calls

APPENDIX G

ROUTING PHASE - SCREEN CAPTURES

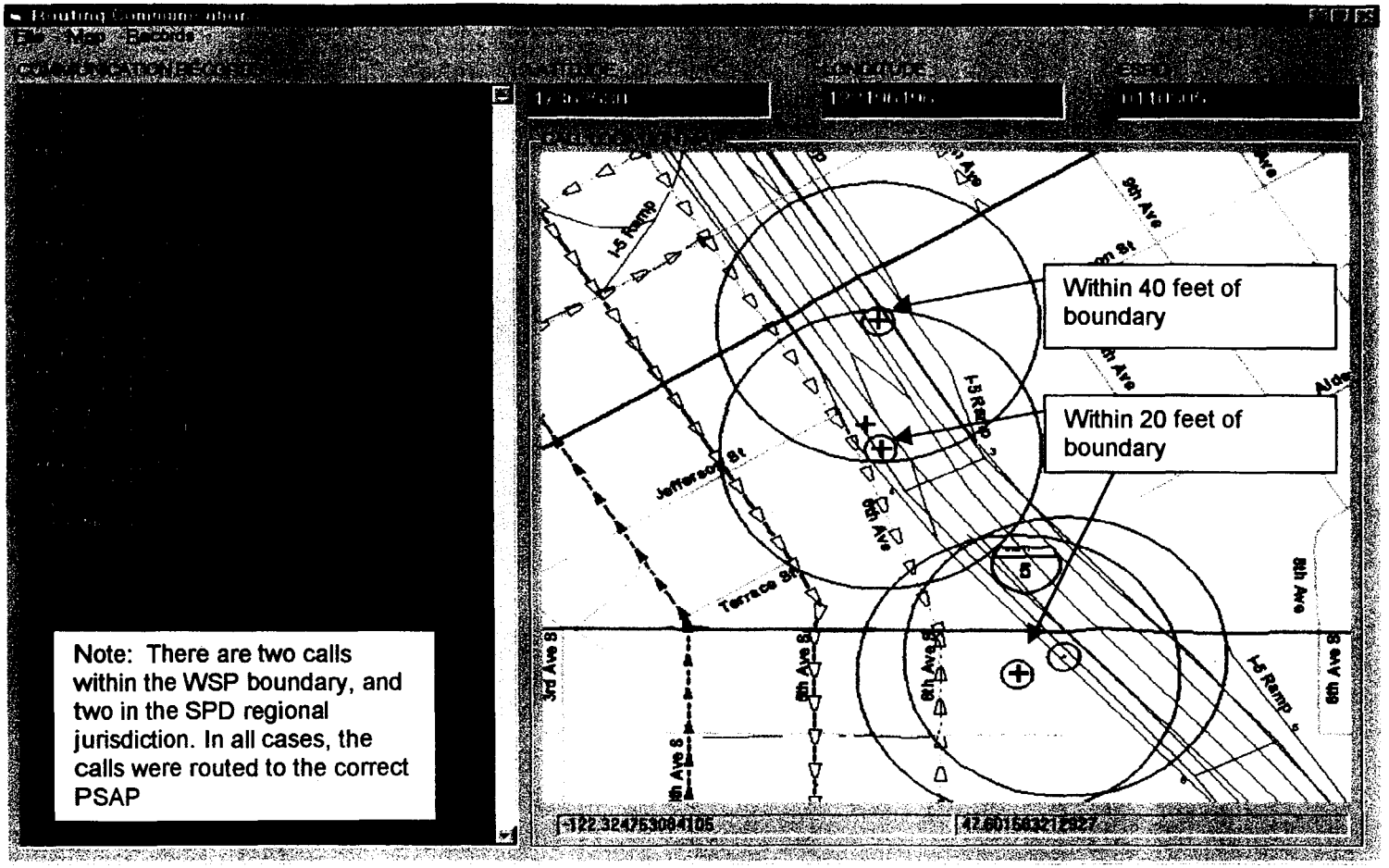


Figure G-1

In **Figure 8-2** (below) this call taker display screen illustrates the caller's position on the highway, and provides information regarding speed and direction. In this example, he caller is in the westbound lane of I-90, traveling NW at 61 MPH. This example proves that IDC was able to obtain, transport, and display location information on the existing Customer Premise Equipment at the Public Safety Answering Point (PSAP). Altitude, speed, and heading were also obtained and displayed on the call taker maps.

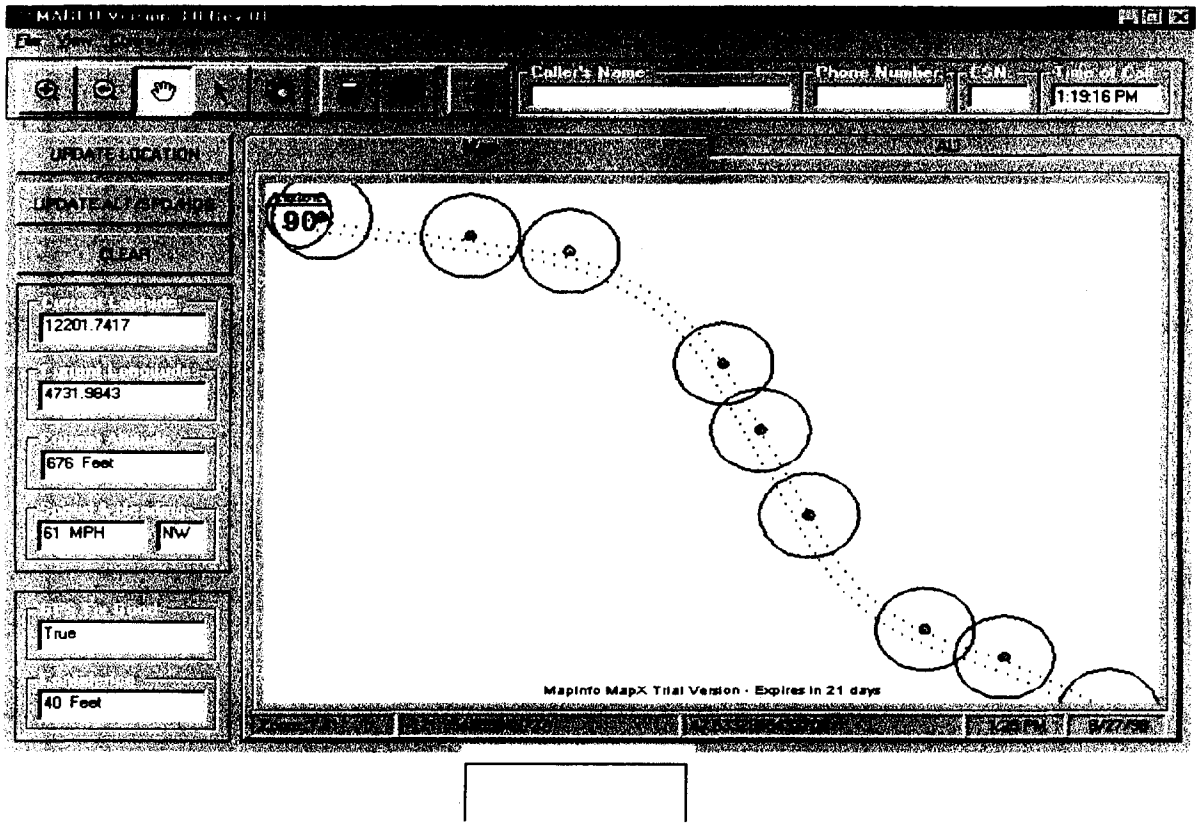


Figure 8-2. Screen Capture to Demonstrate Call Tracking Ability

8.3 CALL PATH SIGNALING: A VIABLE APPROACH

Testing the components individually was a necessary step to:

- Identify "Best in Class" suppliers;
- Help identify the system variables; and
- Control the variables in the data gathering/logging phase.

When IDC integrated the entire system in a live "511" environment[1], we objectively demonstrated and documented that call path signaling across all wireless carrier protocols in

[1] GTE-Wireless, US West and King County set up a 511 system to parallel the existing 911 service so that testing would be as close to actual PSAP environment as possible.